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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
AHN, SAM K	
ART UNIT	**PAPER NUMBER**
2611	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/21/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/686,828	OLSON ET AL.	
	Examiner	Art Unit	
	Sam K. Ahn	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *34* is/are allowed.

6)☒ Claim(s) *1-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *030705*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 101

1. Claims 1-24 and 31-33 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Regarding these claims, the compliance of the claimed invention with the subject matter eligibility requirement of 35 U.S.C. 101 has been determined by the following analysis. The claimed invention does fall within an enumerated statutory category claiming a method or a process. The claimed invention also fall with a 101 judicial exception claiming an algorithm or an abstract idea of performing some calculations to form a matrix, and the claimed invention covers a 101 judicial exception or practical application of the judicial exception. However, treating the claim as a whole, the claim does not have any practical application by physical transformation, and further, does not produce a useful, tangible and concrete result. The claim stops at the forming step, and the claimed limitations do not constitute as a physical transformation or produce useful, tangible result. It merely produces a matrix and does not apply or use the matrix for any purpose as claimed. Therefore, the claim merely recites an algorithm directed to a non-statutory subject matter.

2. Claim 14 is rejected under 35 U.S.C. 101 because the claimed invention is not supported by either a specific and substantial asserted utility or a well established utility.

Claim 14 recites the computational component comprises a computer readable storage medium performing the method steps of claim 1 without supporting in the specification of the specific and substantial asserted utility of the computer readable storage medium.

3. Claim 14 is also rejected under 35 U.S.C. 112, first paragraph. Specifically, since the claimed invention is not supported by either a specific and substantial asserted utility or a well established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 24 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 24 recites the limitation "said first number of intermediate interference vectors" in lines 3-4. There is insufficient antecedent basis for this limitation in the claim. Hence, it is unclear and indefinite to determine how the modified interference matrix is formed.

Claim Objections

5. Claims 6,19-24,26 and 31-33 are objected to because of the following informalities:

In claim 6, define the variables x and y.

In claim 19, line 6, "a channel" should be "the first channel".

In claim 26, line 5, "an orthogonal" should be "the orthogonal".

In claim 31, line 9, "said first result" should be "a first result", line 18.

Claims 20-24 and 32-33 directly or indirectly depend on claim 19 or 31.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-12 and 14-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Madhow et al. US 6,175,587 (Madhow, cited in the IDS).

Regarding claim 1, Madhow teaches a computational component (200 in Fig.2) for performing a method, the method comprising: receiving as part of a signal stream a desired signal path having symbols of a first length (received via 108 in Fig.1 of a desired signal, note col.5, line 27 having length of 64, col.5, lines 16-18); receiving as part of said signal stream an interfering signal path having

symbols of a second length (also receiving multiple-access interference, note col.5, line 27 having length of 8, note col.5, line 66 – col.6, line 1), wherein said second length is less than said first length (wherein length of 8 is less than length of 64); and forming an interference matrix having at least three interference vectors (matrix U_I comprises vectors of, note col.6, line 67 – col.7, line 1, at least three vectors explained in col.6, lines 19-20,30-31 and 42) wherein a first of said interference vectors ($U^L0,2$) includes a representation of at least a portion of a first interfering symbol included in said interfering signal path (includes a left portion of the multiple-access interference), wherein a last of said interference vectors ($U^R0,2$)comprises a representation of at least a portion of a second symbol included in said interfering signal path (includes last portion or right portion), and wherein an intermediate one of said interference vectors ($U_{0,1}$)comprises a representation of all of a third symbol included in said interfering signal path (third symbol of length 8 all with +1, as illustrated in Fig.3).

Regarding claim 2, Madhow further teaches wherein said interference vectors are time-aligned with one another (vectors are time aligned, see Fig.3).

Regarding claim 3, Madhow further teaches wherein said first length is an integer multiple of said second length (previously explained 8 is an integer multiple of 64).

Regarding claim 4, Madhow further teaches wherein said interference matrix comprises a plurality of intermediate interference vectors (at least three vectors, see Fig.3).

Regarding claim 5, Madhow further teaches wherein said interference vectors comprise a number of elements equal to a number of chips in said symbol of said first length (wherein 8 elements in the pilot of desired signal 304 in Fig.3 is equal to $U_{0,1}$).

Regarding claim 6, Madhow further teaches wherein said second length is equal to x elements, wherein said first interference vector comprises y non-zero elements, and wherein said last column comprises x-y non-zero elements (second length of 8 elements, first interference vector $U^{L}0,2$ comprises 3 non-zero elements and last column $U^{R}0,2$ comprises 8-3=5 elements, see Fig.3).

Regarding claim 7, Madhow further teaches wherein said symbol length is measured in chips, and wherein said intermediate interference vector comprises a number of non-zero elements equal to a number of chips in said symbols of said second length (chips or Walsh code of length 8, note col.6, line 1 and see Fig.3).

Regarding claim 8, the claim is rejected as applied to claim 1 and 7 with similar scope.

Regarding claim 9, Madhow further teaches wherein each of said interference vectors of said interference matrix comprises at least one zero value (seeFig.3).

Regarding claim 10, the claim is rejected as applied to claim 6 with similar scope.

Regarding claim 11, Madhow further teaches wherein said interference matrix is used in calculating a projection of a reference signal that is orthogonal to said interfering signal path (note col.6, lines 56-67).

Regarding claim 12, Madhow further teaches wherein said first, second, and third interfering symbols are associated with a first channel, and wherein said interference matrix comprises at least a fourth interference vector comprising a representation of at least a portion of an interfering symbol associated with a second channel (previously explained vectors are traffic channel while $U^{L}1,2$ or a fourth interference vector represents a pilot or a second channel).

Regarding claim 14, Madhow further teaches wherein said computational component comprises a logic circuit (116 in Fig.1).

Regarding claim 15, Madhow further teaches an interference matrix (matrix U_I comprises vectors of, note col.6, line 67 – col.7, line 1, at least three vectors explained in col.6, lines 19-20,30-31 and 42), comprising: at least three interference vectors corresponding to at least three interfering symbols and having a number of elements equal to a number of elements in a desired symbol ($U^L0,2$, $U^R0,2$ and $U_{0,1}$ having 8 elements, see Fig.3), wherein each of said at least three interference vectors includes zero values for a plurality of said elements and a non-zero value for at least a first element (see Fig.3 wherein the vectors comprises zero values and non-zero values).

Regarding claim 16, Madhow further teaches wherein a sum of said elements having non-zero values in said at least three interference vectors is equal to a length of said symbol of interest (see $U_{0,1}$ wherein the sum equaling to 8, which is the length of the desired symbol).

Regarding claim 17, Madhow further teaches further comprising: at least a fourth interference vector corresponding to a fourth interfering symbol and having a number of elements equal to said number of elements in said desired symbol (fourth interference vector $U^L1,2$ also having 8 elements, see Fig.3).

Regarding claim 18, Madhow further teaches further comprising at least two interference vectors corresponding to at least fourth and fifth interfering symbols

and having a number of elements equal to said number of elements in said desired symbol, wherein said at least two interference vector includes zero values for a plurality of said elements and a non-zero value for at least a first element (fourth and fifth interference vectors $U^L1,2$ and $U^R1,2$also having 8 elements, see Fig.3).

Regarding claim 19, Madhow teaches a method for suppressing interference, comprising: identifying an interfering signal (identifying multiple-access interference, note col.5, line 28); tracking said interfering signal (tracking the interference by time aligning within the boundary of limits of a symbol of length 8 as illustrated in Fig.3); for at least a first channel included in said interfering signal (for the second ray traffic signal 306), building an estimate of at least a portion of each symbol of said interfering signal that overlaps with a symbol of interest (symbol of interest I is overlapped partially with the vectors explained in Fig.3), wherein at least three symbols of a channel of said interfering signal at least partially overlap said signal of interest ($U^L0,2$, $U^R0,2$ and $U_{0,1}$, see Fig.3, overlapped partially within symbol i boundary limits); and forming an interference matrix comprising said estimate of at least a portion of each symbol of said interfering signal that overlaps with a symbol of interest (forming U_I ,note col.6, line 67, that have some of the vectors of above partially overlapping).

Regarding claim 20, Madhow further teaches forming a projection, wherein said at least a first channel included in said interfering signal is removed from a received signal to form an interference canceled despread signal stream (note col.6, lines 62-67).

Regarding claim 21, the claim is rejected as applied to claim 19 with similar scope.

Regarding claim 22, the claim is rejected as applied to claim 19 with similar scope.

Regarding claim 23, Madhow further teaches further comprising: forming a modified interference matrix, wherein at least one vector of said interference matrix is omitted (see col.6, line 65 wherein the interference matrix U_I is omitted to from Czf by subtraction).

Regarding claim 24, Madhow further teaches wherein said interference matrix comprises a number of intermediate interference vectors, said method further comprising: forming a modified interference matrix including a subset of said first number of intermediate interference vectors (forming Czf, note col.6, lines 65-67, the modified interference matrix is interpreted as having a certain vectors).

Regarding claim 25, the claim is rejected as applied to claim 1 with similar scope. Madhow further teaches the limitation of a first demodulation finger wherein a first desired signal path is tracked (122 in Fig.1 corresponding to receiving 302,304); a second demodulation finger, wherein a first interfering signal path is tracked (124 in Fig.1 corresponding to receiving 306,308).

Regarding claim 26, Madhow further teaches further comprising: a orthogonal reference signal calculation module (calculating Czf, note col.6, line 65), wherein said interference matrix (U_I) is combined with a reference signal (Udes) that includes short code (code with length 8) associated with said desired signal path (signal path 302,304) and a Walsh covering code associated with a desired channel (note col.6, line 1) to create an orthogonal reference signal (Czf).

Regarding claim 27, Madhow further teaches a signal multiplier (206,210 in Fig.2), wherein said orthogonal reference signal is combined with a received signal to produce a despread and decovered, interference canceled signal stream (output of 220,212).

Regarding claim 28, Madhow further teaches further comprising: a summer (integrator or summer, 208 in Fig.2), wherein said demodulated symbol of interest is obtained from said despread and decovered interference canceled signal stream (Demodulated data output from 208).

Regarding claim 29, the claim is rejected as applied to claim 25 with similar scope. Madhow further teaches means for detecting an active channel (302 in Fig.3).

Regarding claim 30, Madhow further teaches further comprising: means for recovering a desired symbol (output of 208 in Fig.2) from said received signal stream when combined with said orthogonal reference signal (received signal input to 202 is combined at 206 with orthogonal signal output from 216).

Allowable Subject Matter

7. Claim 34 is allowed.

8. The following is a statement of reasons for the indication of allowable subject matter: present application discloses a method and an apparatus for canceling interference in the signal received by determining plurality of vectors to form a matrix. Prior art teaches all the subject matter claimed. However, prior art does not explicitly teach wherein a projection operator to cancel interference is by the equation claimed in claim 34.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sam Ahn whose telephone number is (571) 272-3044. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on (571) 272-3021.

The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sam K. Ahn
Patent Examiner

3/15/07